

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Applicant: Isao Mochida et al.

Title: Heat-Treated Active Carbons for Use in Denitration, Processes for Producing Same, Denitration Method Using Same, and Denitration System Using Same

Prior Appl. No.: 09/637,249

Prior Filing Date: August 14, 2000

Examiner: Unassigned

Art Unit: Unassigned

PRELIMINARY AMENDMENT

Assistant Commissioner for Patents
Washington, D.C. 20231

Sir:

Prior to examination of the above-identified application, Applicants respectfully request that the following amendments be entered into the application:

IN THE SPECIFICATION:

On page 1, delete the 1st full paragraph, and replace this paragraph with the following in accordance with 37 CFR §1.121. A marked up version showing changes is attached:

This is a divisional of application Serial No. 09/637,249 filed August 14, 2000, which is a divisional of application Serial No. 08/817,659 filed April 22, 1997, which is a national phase of PCT/JP96/02737 filed September 24, 1996.

IN THE CLAIMS:

Please cancel claims 1-10 and 20 their entirety, without prejudice or disclaimer.

In accordance with 37 CFR §1.121, please substitute for claims 11 and 16 the following rewritten version of the same claims, as amended. The changes are shown explicitly in the attached "Version with Markings to Show Changes Made."

11. (Amended) A denitration method which comprises bringing exhaust gas containing nitrogen oxides and not more than 80% of water as water vapor, and NH_3 gas having the same concentration as the nitrogen oxides into contact with a heat-treated active carbon, said heat-treated active carbon is prepared by heat-treating an active carbon at 600° to $1,200^\circ \text{C}$ in a non-oxidizing atmosphere so as to remove oxygen-containing functional groups present at the surfaces thereof and thereby reduce the atomic surface oxygen/surface carbon ratio to 0.05 or less, at a temperature ranging from ordinary temperature to 150°C , in order to reduce the nitrogen oxides selectively and thereby decompose them to nitrogen and water.

16. (Amended) A denitration system using active carbon as claimed in claim 13 wherein said raw active carbon comprises carbon fibers derived from polyacrylonitrile or pitch.

Please add the following new claims.

21. (New) A denitration method which comprises bringing exhaust gas containing nitrogen oxides and not more than 80% of water as water vapor, and NH_3 gas having the same concentration as the nitrogen oxides into contact with a heat-treated active carbon, said heat-treated active carbon is prepared by heat-treating an active carbon at 600° to $1,200^\circ \text{C}$ in a non-oxidizing atmosphere and activating the surfaces thereof with sulfuric acid or nitric acid to impart oxidizing oxygen-containing functional groups thereto, at a temperature ranging from ordinary temperature to 150°C , in order to reduce the nitrogen oxides selectively and thereby decompose them to nitrogen and water.

22. (New) A denitration method as claimed in claim 21 wherein a higher degree of denitration of nitrogen oxides having a low temperature and a low concentration is performed at the outlet of an exhaust gas treating apparatus or the outlet of a boiler.

REMARKS

Applicants respectfully request that the foregoing amendments be entered prior to examination. Claim 11, originally dependent upon claims 3, 4, 7 or 8, has been amended to incorporate the subject matter of claim 1. Claim 16 has been amended to eliminate the multiple dependency. New claim 21 has been added which has support in original claim 11. Claim 21 recites the method of claim 11, wherein the active carbon is preparing according to claim original claim 5. Claim 22 recites the subject matter of original claim 12, with the difference being the method of producing the heat-treated active carbon.


Should there be any questions, the Examiner is courteously invited to contact the undersigned at the telephone number shown below.

The Commissioner is hereby authorized to charge any additional fees which may be required regarding this application under 37 C.F.R. § 1.16-1.17, or credit any overpayment, to Deposit Account No. 19-0741. Should no proper payment be enclosed herewith, as by a check being in the wrong amount, unsigned, post-dated, otherwise improper or informal or even entirely missing, the Commissioner is authorized to charge the unpaid amount to Deposit Account No. 19-0741.

Respectfully submitted,

Date: Feb. 25, 2002

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Marked-up version of specification:

This is a divisional of application Serial No. 09/637,249 filed August 14, 2000, which is a divisional of application Serial No. 08/817,659 filed April 22, 1997, [which is a continuation of application Serial No. 08/776,519 filed July 18, 1997] which is a national phase of PCT/JP96/02737 filed September 24, 1996.

Marked-up claims:

11. (Amended) A denitration method which comprises bringing exhaust gas containing nitrogen oxides and not more than 80% of water as water vapor, and NH₃ gas having the same concentration as the nitrogen oxides into contact with a heat-treated active carbon, said heat-treated active carbon is prepared by heat-treating an active carbon at 600° to 1,200 °C in a non-oxidizing atmosphere so as to remove oxygen-containing functional groups present at the surfaces thereof and thereby reduce the atomic surface oxygen/surface carbon ratio to 0.05 or less, [for use in the denitration of exhaust gas as claimed in any one of claims 3, 4, 7 and 8, at a temperature ranging from ordinary temperature to 150°C, in order to reduce the nitrogen oxides selectively and thereby decompose them to nitrogen and water.

16. (Amended) A denitration system using active carbon as claimed in claim 13 [any of claims 13 to 15] wherein said raw active carbon comprises carbon fibers derived from polyacrylonitrile or pitch.

21. (New) A denitration method which comprises bringing exhaust gas containing nitrogen oxides and not more than 80% of water as water vapor, and NH₃ gas having the same concentration as the nitrogen oxides into contact with a heat-treated active carbon, said heat-treated active carbon is prepared by heat-treating an active carbon at 600° to 1,200 °C in a non-oxidizing atmosphere and activating the surfaces thereof with sulfuric acid or nitric acid to impart oxidizing oxygen-containing functional groups thereto, at a temperature ranging from ordinary temperature to 150°C, in order to reduce the nitrogen oxides selectively and thereby decompose them to nitrogen and water.

22. (New) A denitration method as claimed in claim 21 wherein a higher degree of denitration of nitrogen oxides having a low temperature and a low concentration is performed at the outlet of an exhaust gas treating apparatus or the outlet of a boiler.

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